Release notes for ENDF/B Development g-094_Pu_241 evaluation

December 2, 2016

- `checkr` Warnings:

  1. A previous error halted parsing of the current section
     MAT=9443, MF= 1, MT=451 (1): Parsing stopped

     ```
     ERROR(S) FOUND IN MAT=9443, MF= 1, MT=451
        SECTION CANNOT BE CHECKED FROM SEQUENCE NUMBER       46 TO      56
     ```

  2. Although the ENDF manual says MT=18/MF=4 is allowed only for the neutron sublibrary, this is too restrictive as all fission events lead to emitted neutrons
     MAT=9443, MF= 4, MT= 5 (0): Ang. dist. OK

     ```
     ERROR(S) FOUND IN MAT=9443, MF= 4, MT=  5
        FILE  4 ALLOWED ONLY IN A NEUTRON DATA SUBLIBRARYRECORD NUMBER     433
     ```

  3. A previous error halted parsing of the current section
     MAT=9443, MF= 4, MT= 5 (1): Parsing stopped

     ```
     ERROR(S) FOUND IN MAT=9443, MF= 4, MT=  5
        SECTION CANNOT BE CHECKED FROM SEQUENCE NUMBER      433 TO     435
     ```

  4. Although the ENDF manual says MT=18/MF=4 is allowed only for the neutron sublibrary, this is too restrictive as all fission events lead to emitted neutrons
     MAT=9443, MF= 4, MT= 16 (0): Ang. dist. OK

     ```
     ERROR(S) FOUND IN MAT=9443, MF= 4, MT= 16
        FILE  4 ALLOWED ONLY IN A NEUTRON DATA SUBLIBRARYRECORD NUMBER     436
     ```

  5. A previous error halted parsing of the current section
     MAT=9443, MF= 4, MT= 16 (1): Parsing stopped

     ```
     ERROR(S) FOUND IN MAT=9443, MF= 4, MT= 16
        SECTION CANNOT BE CHECKED FROM SEQUENCE NUMBER      436 TO     438
     ```

  6. Although the ENDF manual says MT=18/MF=4 is allowed only for the neutron sublibrary, this is too restrictive as all fission events lead to emitted neutrons
     MAT=9443, MF= 4, MT= 18 (0): Ang. dist. OK

     ```
     ERROR(S) FOUND IN MAT=9443, MF= 4, MT= 18
        FILE  4 ALLOWED ONLY IN A NEUTRON DATA SUBLIBRARYRECORD NUMBER     439
     ```

  7. A previous error halted parsing of the current section
     MAT=9443, MF= 4, MT= 18 (1): Parsing stopped

     ```
     ERROR(S) FOUND IN MAT=9443, MF= 4, MT= 18
        SECTION CANNOT BE CHECKED FROM SEQUENCE NUMBER      439 TO     441
     ```

  8. Although the ENDF manual says MT=18/MF=5 (PFNS) and MT=455 (nubar) are allowed only for the neutron sublibrary, this is too restrictive as all fission events lead to emitted neutrons.
     MAT=9443, MF= 5, MT= 5 (0): PFNS, nubar OK

     ```
     ERROR(S) FOUND IN MAT=9443, MF= 5, MT=  5
        FILE  5 NOT ALLOWED FOR NSUB =     0             RECORD NUMBER     443
     ```

9. A previous error halted parsing of the current section
MAT=9443, MF= 5, MT= 5 (1): Parsing stopped

```
ERROR(S) FOUND IN MAT=9443, MF= 5, MT=  5
   SECTION CANNOT BE CHECKED FROM SEQUENCE NUMBER      443 TO    2041
```

10. Although the ENDF manual says MT=18/MF=5 (PFNS) and MT=455 (nubar) are allowed only for the neutron sublibrary, this is too restrictive as all fission events lead to emitted neutrons.
MAT=9443, MF= 5, MT= 16 (0): PFNS, nubar OK

```
ERROR(S) FOUND IN MAT=9443, MF= 5, MT= 16
   FILE  5 NOT ALLOWED FOR NSUB =     0             RECORD NUMBER    2042
```

11. A previous error halted parsing of the current section
MAT=9443, MF= 5, MT= 16 (1): Parsing stopped

```
ERROR(S) FOUND IN MAT=9443, MF= 5, MT= 16
   SECTION CANNOT BE CHECKED FROM SEQUENCE NUMBER     2042 TO    2623
```

12. Although the ENDF manual says MT=18/MF=5 (PFNS) and MT=455 (nubar) are allowed only for the neutron sublibrary, this is too restrictive as all fission events lead to emitted neutrons.
MAT=9443, MF= 5, MT= 18 (0): PFNS, nubar OK

```
ERROR(S) FOUND IN MAT=9443, MF= 5, MT= 18
   FILE  5 NOT ALLOWED FOR NSUB =     0             RECORD NUMBER    2624
```

13. A previous error halted parsing of the current section
MAT=9443, MF= 5, MT= 18 (1): Parsing stopped

```
ERROR(S) FOUND IN MAT=9443, MF= 5, MT= 18
   SECTION CANNOT BE CHECKED FROM SEQUENCE NUMBER     2624 TO    6400
```

- `checkr` Errors:

1. A variable is outside the allowed ENDF range
MAT=9443, MF= 1, MT=451 (0): Variable range

```
ERROR(S) FOUND IN MAT=9443, MF= 1, MT=451
   MOD =     1 OUT OF RANGE     0 -     0           RECORD NUMBER      46
```

2. Missing a section/file
MAT=9443, MF= 1, MT=456 (0): Missing data (a)

```
ERROR(S) FOUND IN MAT=9443, MF= 1, MT=456
   THIS SECTION REQUIRES THE PRESENCE OF SECTION  1/RECORD NUMBER      57
```

3. Missing nubar_total or LFI flag is set wrong
MAT=9443, MF= 1, MT=456 (1): No nubar_tot

```
ERROR(S) FOUND IN MAT=9443, MF= 1, MT=456
   LFI INCORRECT OR NUBAR-TOTAL MISSING   PRECEDING RECORD NUMBER      63
```

4. Missing a section in directory so your directory is messed up. This error will break everything else
   MAT=9443, MF= 3, MT= 5 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=9443, MF= 3, MT=  5
   SECTION  3/  5 NOT IN DIRECTORY                  RECORD NUMBER     169
```

5. Missing a section in directory so your directory is messed up. This error will break everything else
   MAT=9443, MF= 3, MT= 16 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=9443, MF= 3, MT= 16
   SECTION  3/ 16 NOT IN DIRECTORY                  RECORD NUMBER     272
```

6. Missing a section in directory so your directory is messed up. This error will break everything else
   MAT=9443, MF= 3, MT= 18 (0): Directory (b)

```
ERROR(S) FOUND IN MAT=9443, MF= 3, MT= 18
   SECTION  3/ 18 NOT IN DIRECTORY                  RECORD NUMBER     332
```

- `fizcon` Errors:

1. Missing files (probably nubar)
   MAT=9443, MF= 1, MT=456 (1): Missing files (b)

```
ERROR(S) FOUND IN MAT=9443, MF= 1, MT=456
   THIS SECTION REQUIRES THAT MISSING FILE  1, MT= 452  BE PRESENT
```

2. Missing files (probably nubar)
   MAT=9443, MF= 1, MT=456 (2): Missing files (d)

```
ERROR(S) FOUND IN MAT=9443, MF= 1, MT=456
   BOTH SECTIONS MF=1, MT=455 AND MT=456 MUST BE PRESENT
```

3. A level's energy is somehow off
   MAT=9443, MF= 3, MT= 18 (1): Bad Elevel (a)

```
WARNING(S)     IN MAT=9443, MF= 3, MT= 18
   Q= 0.00000E+00 MIGHT BE UNREASONABLE             SEQUENCE NUMBER     1
```

4. Outgoing energy E' not energetically allow: E' .le. E-Q.
   MAT=9443, MF= 5, MT= 5 (1): Big Eout

```
ERROR(S) FOUND IN MAT=9443, MF= 5, MT=  5
   FOR LF=1 EPMAX FOUND TO BE 4.00000E-05 SHOULD BE 0.00000E+00
```

5. Outgoing energy E' not energetically allow: E' .le. E-Q.
   MAT=9443, MF= 5, MT= 16 (1): Big Eout

```
ERROR(S) FOUND IN MAT=9443, MF= 5, MT= 16
   FOR LF=1 EPMAX FOUND TO BE 4.00000E-05 SHOULD BE 0.00000E+00
```

6. The cross section and an outgoing distribution don't span the same energy region.
   MAT=9443, MF= 5, MT= 18 (1): Diff limits (a)

```
ERROR(S) FOUND IN MAT=9443, MF= 5, MT= 18
   SECTION DOES NOT SPAN THE SAME ENERGY RANGE AS FILE   3, MT=  18
```

7. Missing files (probably spectra for outgoing particles)
   MAT -1 MF 6 (1): Missing files (a)

```
ERROR(S) - MISSING SECTIONS IN MAT   -1 MF  6
   PRESENCE OF FILE 3, MT=   5 REQUIRES AN EQUIVALENT SECTION IN FILE 6
   PRESENCE OF FILE 3, MT=  16 REQUIRES AN EQUIVALENT SECTION IN FILE 6
   PRESENCE OF FILE 3, MT=  18 REQUIRES AN EQUIVALENT SECTION IN FILE 6
```

- `fudge-4.0` Warnings:

1. First cross section point not zero right at threshold
   reaction label 0: n[multiplicity:'2'] + Pu239 / Cross section: (Error # 0): nonZero_crossSection_at_threshold

```
WARNING: First cross section point for threshold reaction should be 0, not 0.0177
```

2. First cross section point not zero right at threshold
   reaction label 2: sumOfRemainingOutputChannels / Cross section: (Error # 0): nonZero_crossSection_at_thres

```
WARNING: First cross section point for threshold reaction should be 0, not 0.001313
```

3. Cross section does not match sum of linked reaction cross sections
   crossSectionSum label 0: nonelastic (Error # 0): CS Sum.

```
WARNING: Cross section does not match sum of linked reaction cross sections! Max diff: 63.36%
```

- `fudge-4.0` Errors:

1. Calculated and tabulated Q values disagree.
   reaction label 0: n[multiplicity:'2'] + Pu239 (Error # 1): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: -11829657.16748047 eV vs -1.1774e7 eV!
```

2. Calculated and tabulated thresholds don't agree
   reaction label 1: n[multiplicity:'energyDependent', emissionMode:'prompt'] [total fission] / Cross section: (Error # 0): Threshold mismatch

```
WARNING: Calculated and tabulated thresholds disagree: 1.e-5 eV vs 4.e6 eV!
```

3. Energy range of data set does not match cross section range
   reaction label 1: n[multiplicity:'energyDependent', emissionMode:'prompt'] [total fission] / Product: n / Distribution: / uncorrelated - energy - XYs2d: (Error # 0): Domain mismatch (a)

```
WARNING: Domain doesn't match the cross section domain: (6000000.0 -> 20000000.0) vs (4000000.0 -> 20000000.0)
```

4. Calculated and tabulated Q values disagree.
   reaction label 2: sumOfRemainingOutputChannels (Error # 1): Q mismatch

```
WARNING: Calculated and tabulated Q-values disagree: 223603402816.2303 eV vs -5.2406e6 eV!
```